Analysis of Populations of Sports and Commercial Fin-fish in the Coastal Bays of Texas

Project MF-R-7, Job No. 1

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Abstract

Juvenile game fish were sampled in all bay areas in 1966 with 60-foot bag-seines; adult fish were sampled with trammel nets and drag-seines. Production of juvenile redfish, Sciaenops ocellata, was up in Galveston Bay, San Antonio Bay and Lower Laguna Madre areas and down in Matagorda Bay. Juvenile trout, Cynoscion nebulosus, black drum, Pogonias cromis, and sheepshead, Archosargus probatocephalus, increased in Matagorda Bay but decreased in Galveston Bay and the Lower Laguna Madre. Declines in abundance were noted for juvenile flounder, Paralichthys lethostigma, in Galveston, Matagorda and San Antonio Bays and in the Lower Laguna Madre.

Adult redfish and black drum increased in yield in all Texas bay areas in 1966. Adult trout populations were up in San Antonio Bay and in the Lower Laguna Madre and down in Galveston, Matagorda and Aransas Bays.

During 1966 3,030 trout, 2,190 redfish, 2,054 black drum, 1,384 sheepshead and 159 flounder were tagged and released in Texas bays.

Introduction

The commercial catch of trout, Cynoscion nebulosus, redfish, Sciaenops ocellata, black drum, Pogonias cromis, flounder, Paralichthys lethostigma, and sheepshead, Archosargus probatocephalus, during the 1965-1966 fiscal year, was 3,117,650 pounds, or over 95 per cent of the total landings of edible finfish from Texas bays. These five species are also important to the sports fishery, which is reliably estimated to be at least equal to the commercial fishe

Work done during this study included routine sampling of juveniles and adults of these five species in each of seven Texas bay systems. In order to determine relative abundance, annual fluctuations in abundance and success of spawning, fish of sufficient size caught by these methods and by supplementary means were tagged and released to study movements, migrations and rate of fishing harvest.

Description of Area

The seven major bay areas of the Texas coast sampled during this study were the Galveston, Matagorda, San Antonio, Aransas, Corpus Christi, and Upper and Lower Laguna Madre Bay systems.

Materials and Methods

Juvenile Fish - A 6-foot bar-seine of 1/2-inch stretched mesh was pulled by hand a distance of 500 feet at prescribed stations in the Galveston, Matagorda and San Antonio Bay areas. This method was not used in the other areas.

A 60-foot bag-seine, 6 feet deep, of 3/4-inch stretched mesh was used at prescribed stations in all bay areas. The area covered by the seine was calculated for each sample.

All juvenile game fish were measured and reported as number of individuals per acre.

Juvenile fish samples were not required during the summer months of 1966 (June, July and August) since these months are not critical for sampling of redfish, flounder and trout and to allow additional time for supplemental fish tagging. However, it has been noted that there was no increased supplemental fish tagging and that juvenile sheepshead and black drum were inadequately sampled. These samples will be required in 1967.

Adult Fish - A drag seine of varying length, 6 feet deep and of 2-inch mesh, was used at prescribed stations in the Galveston, Aransas, Corpus Christi and Upper Laguna Madre Bay areas to sample adult fish. The seines were pulled and the areas covered were calculated.

A trammel net 1,200 feet long, 40 inches deep, of 3-inch stretched inside mesh and 12-inch stretched outside mesh was used at prescribed stations in the Matagorda, San Antonio and the Lower Laguna Madre Bay areas to sample fish. The nets were struck and the areas enclosed were calculated.

In an effort to intensify and expand adult fish sampling in all areas, sampling was confined to two periods (generally spring and fall) in each bay area. Many factors were involved in the selection of sampling periods; two of these were availability of species involved and chance for successful sampling of these species.

Spring sampling was accomplished in the months of June and July in all areas using the drag seine as the principle sampling device (Galveston, Aransas, Corpus Christi and Upper Laguna Madre). Adult fish samples were taken by trammel net in March and April in Matagorda and San Antonio Bay areas, while interval sampling was done in May and June in the Lower Laguna Madre.

In all adult fish samples, game fish were measured and counted by species. Length-weight relationship tables for each species were used to calculate weights and the yield was reported in pounds per acre by species.

Adult game fish captured by drag seine and trammel net in the routine samples were usually tagged and released. Gill nets, gigs, trotlines and hooks and lines were also used to obtain fish for tagging. Fish were tagged with monel jaw tags or with internal tags and external streamers.

Results

Juvenile Fish Sampling - The results of juvenile fish sampling by 60-foot seine for 1965 and 1966 in each bay system are shown in Figures 1 through 7.

Area M-2 and 3 - Galveston Bay (Figure 1)

All samples were taken throughout the entire year.

Redfish - Samples taken in 1966 indicate a definite increase in juvenile redfish over the two previous years. The 1966 primary peak average of 57 per acre compares very favorably with those of 22 per acre in 1965 and 47 per acre in 1964. The second highest catch in 1966 (23 per acre in March and June) compares well with 1965 (11 per acre in March) and 1964 (27 per acre in April).

Trout - A definite decline in juvenile trout in 1966 is indicated by the samples. The highest average yield in 1966 was 13 per acre in September. This compares unfavorably with average yields of 37 per acre in September, 49 per acre in October and 29 per acre in November in 1965. The 1964 peak was 45 per acre in November.

Black drum - As in 1964 and 1965 the peak abundance was noted in July. In 1966, however, the average yield reached only 53 per acre compared to 173 per acre in 1965 and 124 per acre in 1964.

Sheepshead - Juvenile sheepshead were almost absent from all 60-foot seine samples in 1966 indicating a decline from the two previous years.

Flounder - Juvenile flounder catches declined in 1966. The peak average yield reached 4 per acre in June compared to 8 per acre in April 1965 and 27 per acre in 1964.

In summary, an increase in abundance in juvenile redfish was noted in 1966 over the previous year, but declines in abundance were noted for all other species.

Area M-4 - Matagorda Bay (Figure 2)

As in Galveston Bay, all samples were taken throughout the entire year.

Redfish - Even though some samples were not taken in 1965, there appeared to be a decline in abundance of juvenile redfish in 1966. Peaks of 46 per acre in February and 17 per acre in March were noted in 1965, while in 1966 average yield never exceeded 13 per acre.

Trout - A peak abundance of 70 per acre was noted for September and 28 per acre in October in 1966. The highest peaks in previous years were 21 per acre in November 1965 and 28 per acre in 1964.

Black drum - Since the peak was missed in 1965 (no samples taken) no comparison can be made, but average yields of 8, 21 and 7 per acre were noted in June, July and August 1966 respectively. The graph comparisons (Figure 2) indicate an increase in 1966.

Sheepshead - This also applies to sheepshead.

Flounder - A decline in abundance in juvenile flounder was noted in 1966. The peak of 4 per acre was noted in March 1966 compared to 20 per acre the same month in 1965.

In summary, a decline in abundance was noted for redfish and flounder in 1966, while an increase was noted for trout, sheepshead and black drum.

Area M-5 - San Antonio Bay (Figure 3)

The absence of samples in the summer of 1965 (not required) and the absence of samples in 1966 after March (lack of personnel) makes any comparison difficult. An increase in redfish, as noted in comparing the February samples, may be indicated.

Area M-6 - Aransas Bay (Figure 4)

Required samples were reported taken in the summer of 1965 but data sheets were not submitted. Samples were missed in February, May and October 1966 and this makes comparisons difficult for some species.

Redfish - The peak month for 1965 was February and no samples were taken in February 1966. Based on the December 1965 peak of 30 per acre, the 1966 crop appears to be successful and on a par with the two previous years.

Trout - Spring samples in 1965 were low but were higher than in 1966. Fall samples in 1965 were significantly higher than fall samples in 1966.

Black drum - Few drum were caught either year.

Sheepshead - Based on the comparisons of a single month (September), the abundance of juvenile sheepshead appears to have been about the same in 1965 and 1966.

Flounder - The absence of May samples in 1966 prevents accurate comparisons, but unless the spring peak was late in coming 1966 represents a decline in abundance of juvenile flounder.

In summary, juvenile redfish and sheepshead populations remained on a par with the previous year, while juvenile flounder declined in abundance in 1966.

Area M-7 - Corpus Christi Bay (Figure 5)

Samples were taken in all but the summer months when they were not required.

Redfish - While the 1965 peak was higher (20 per acre in February), the 1966 peak of average abundance was more extended (11 per acre in February, 9 in March, and 10 in April). No significant increase or decrease in abundance is noted.

Trout - The absence of summer samples is unfortunate, but spring samples represent a slight decline since 1965.

Flounder - Few flounder were taken in either year.

In summary, little, if any, change was noted in any species.

M-8 - Upper Laguna Madre (Figure 6)

Lack of Personnel prevented sampling.

M-9 - Lower Laguna Madre (Figure 7)

All required samples were taken in both 1965 and 1966 (all months except June, July and August).

Redfish - In spite of average yields of 90 per acre in February and 110 per acre in April in 1965, the 1966 sampling indicates an increase. In 1966, peaks of 138 per acre in March and 98 per acre in April were noted.

Trout - A definite decline was noted in 1966. In 1966 the highest peak was 12 per acre, while in 1965 there were three peaks of over 20 per acre.

Black drum - Few juvenile drum were noted in 1965; even fewer were taken in 1966.

Sheepshead - In spite of the lack of summer samples in both years, during which the peak would have occurred, a decline of abundance in 1966 was noted.

Flounder - In 1966 a peak of 11 per acre in April compares unfavorably with the peak of 38 per acre in the same month the previous year.

In summary, while juvenile redfish increased in abundance in 1966, all other species declined.

Juvenile Game Fish Summary

Redfish - Production of redfish was up in the Galveston, San Antonio Bay and Lower Laguna Madre areas in 1966 over 1965, but a decline was evident in the Matagorda Bay area. No change was seen in the Aransas Bay or the Corpus Christi Bay areas.

Trout - Only in the Matagorda Bay area were increases in trout reported, while decreases were noted in Galveston Bay, Corpus Christi Bay and the Lower Laguna Madre. No change was noted in the Aransas Bay area.

Black drum - As in the case of trout, increases were noted in Matagorda Bay, decreases in Galveston Bay and Lower Laguna Madre, and no change in Aransas Bay.

Sheepshead - This also applies to sheepshead.

Flounder - Juvenile flounder declined in numbers in the Galveston, Matagorda, San Antonio and Lower Laguna Madre areas. No increase in abundance over 1965 was noted in any bay area.

Adult Game Fish Sampling

The results of adult game fish sampling by drag-seine and trammel net for 1965 and 1966 in each bay system are shown in Figures 8 through 14. The shaded columns in the 1965 sections of these figures correspond to the sampling periods for 1966 for comparison purposes. Since the periods of sampling for 1965 and 1966 do not coincide exactly, comparisons of results for the two years will not be made unless the results indicate a definite trend.

Neither the drag-seine nor the trammel net is adequate for sampling flounder in Texas bays. Therefore, figures on this species will not be considered.

Sheepshead are difficult to catch in trammel nets; therefore, figures for this species will not be presented for Matagorda Bay, San Antonio Bay and the Lower Laguna Madre.

Galveston Bay (Figure 8)

Spring sampling in Galveston Bay was restricted somewhat due to flooding of the Trinity River. There were 14 drag-seine samples in West Bay, 6 in Moses Lake and 5 in Jones Lake. The sampling period was from May 15 to June 30, 1966.

Fall sampling consisted of 24 drag-seine samples in the period from October 15 to November 30, 1966.

Redfish - 1966 sampling indicates the best year for redfish since adult sampling began in this area. Spring samples averaged 2.5 pounds per acre, and fall samples over 1.6 pounds per acre. Both of these figures are above the 0.5 pounds per acre and 0.6 pounds per acre for the same periods in the previous year.

Trout - The 1966 averages of 4.2 and 3.7 pounds per acre are much lower than the peaks attained within the same period in 1965. However, if the two yields are compared with the same periods for 1965, the decrease is not as great as the figure indicates.

Black drum - The 1966 averages of 1.15 and 1.20 pounds per acre indicate increases over the 1965 yields, which never exceeded 0.7 pounds per acre.

Sheepshead - The spring yield of 9.3 pounds per acre compares favorably with the similar peak of 8.8 pounds per acre in June of 1965. The fall yield of 4 pounds per acre would be difficult to compare, since the 1965 fall peak of 42.1 pounds per acre did not occur in the same time period.

In general, redfish and black drum experienced an increase, while trout decreased in abundance in 1966.

Matagorda Bay (Figure 9)

Thirty strikes were made with the trammel net between February 15 and March 31, 1966. No fall samples were taken due to a shortage of personnel.

Redfish - The spring average yield of 3.9 pounds per acre far exceeds the average of less than 1.0 pounds per acre for the comparable period in 1965.

Trout - The spring average yield of 2.4 pounds per acre indicates a slight decline in numbers compared to the same period in 1965 (3.4 pounds per acre).

Black drum - A definite increase in the number of drum was noted in 1966 compared to 1965. The 1966 spring average yield was 2.5 pounds per acre, while that of 1965 was less than 1.0 pounds per acre.

Redfish and black drum apparently increased in abundance in 1966, while trout decreased.

San Antonio Bay (Figure 10)

Seven trammel strikes were taken in March before the resignation of personnel prevented further sampling for the year.

Redfish - Based on these few samples, redfish showed an increase to almost 11.0 pounds per acre compared to 0.1 pounds per acre in 1965 for the comparable spring period. This yield is comparable to the October 1965 yield of redfish.

Trout - The same is true for trout. The 6.5 pounds per acre in March 1966 compares with the 7.3 pounds per acre in October 1965 and greatly exceeds the March 1965 yield of 0.9 pounds per acre.

Black drum - The March 1966 average yield was 2.3 pounds per acre, while in 1965 too few drum were taken to even graph.

Limited samples indicate all three species, redfish, trout and black drum, increased in abundance over the comparable spring period in 1965.

Aransas Bay (Figure 11)

Between May 15 and June 30, 1966, 33 samples were taken with the drag-seine. During the fall period (October 15 to November 30, 1966) samples were taken with both drag-seine and trammel net due to extensive drag-seine damage. There were 10 samples with the drag seine and 11 with the trammel net.

Redfish - The spring yield of 3.5 pounds per acre exceeded the comparable yield of the previous year of 1.0 pounds per acre. The fall sampling indicated a drop, however, from 5.3 pounds per acre in 1965 to 2.9 pounds per acre in 1966. An overall increase was evident.

Trout - The spring and fall average yields of trout in 1966 were 2.5 and 2.4 pounds per acre respectively. This represents a decline in numbers from 1965.

Black drum - Average yields of 4.2 and 1.5 pounds per acre were attained in 1966. In the previous year black drum catches never exceeded 0.5 pounds per acre.

Sheepshead - Spring samples for both years are similar. Fall samples, however, indicate a decline in sheepshead. It should be remembered that half the fall 1966 samples were taken with trammel net, which may account for the low yield.

In summary, redfish and black drum increased in numbers, while trout declined. Sheepshead populations probably did not change to any extent.

Corpus Christi Bay (Figure 12)

Adult game fish samples for 1966 consisted of 23 drag-seine samples in the spring (May 15 to June 30) and 20 drag-seine samples in the fall (October 15 to November 30).

Redfish - Both spring and fall sampling indicated an increase in redfish over the previous year. Average yields of 0.9 and 1.5 pounds per acre compared well with less than 0.2 pounds per acre for both comparable periods in 1965.

Trout - Little, if any, significant change was noted in trout populations in 1966. The slight differences in average yield could be due to sampling changes.

Black drum - While average black drum yields in 1966 were low (0.4 and 0.8 pounds per acre in the spring and fall samples respectively), catches in 1965 were even lower indicating an increase in abundance in 1966.

Sheepshead - While spring samples were up in 1966, fall samples were significantly down, and the net effect was probably a decline in numbers of sheepshead in Corpus Christi Bay.

In general redfish and black drum increased in abundance, while sheepshead decreased. No change was noted in trout populations.

Upper Laguna Madre (Figure 13)

There were 25 drag-seine samples taken in the spring and 20 in the fall. The sampling periods covered the same dates as in the previous two bay areas. No samples were obtained in the last four months of 1965 due to resignation of personnel.

Redfish - The average catch of 0.9 pounds per acre for redfish in the spring of 1966 was a definite increase over the 0.1 pounds per acre in 1965. Fall samples for 1966 were low (0.2 pounds per acre) but no comparison with 1965 can be made.

Trout - The data indicate no significant change in trout populations. The 1966 spring average yield was 2.6 pounds per acre which is close to the averages of June and July for 1965.

Black drum - A catch of 11.2 pounds per acre in 1966 compared favorably to none in the same period in 1965.

Sheepshead - Spring samples show an increase in sheepshead in the Upper Laguna Madre (1.3 pounds per acre in 1966 compared to 0.2 pounds per acre in 1965). Fall samples are high (4.25 pounds per acre in 1966) but cannot be compared due to absence of samples in 1965.

In summary the Upper Laguna Madre area experienced an increase in redfish, black drum and sheepshead in 1966, while no change was noted for trout.

Lower Laguna Madre (Figure 14)

Twenty-six trammel net strikes were made in the spring sampling period (April 15 to June 15) and 30 strikes in the fall period (October 15 to December 15).

Redfish - An increase in redfish was noted in 1966 over 1965 (2.1 pounds per acre compared to 0.4 pounds per acre) in the spring samples. No important difference was indicated by the fall samples.

Trout - Spring trout samples averaged 4.0 pounds per acre in 1966 compared to only 2.4 pounds per acre in the same period in 1965. Fall samples showed no noteworthy change.

Black drum - Spring samples in 1965 averaged 0.3 pounds per acre, while the comparable period in 1966 yielded 0.8 pounds per acre. Neither figure is considered greatly significant but some increase was noted in 1966. Fall samples for 1966 indicated no change from the same period in 1965.

All three species, redfish, trout and black drum, had increases in 1966 over 1965 for the spring samples and no change for the fall samples.

Adult Game Fish Summary

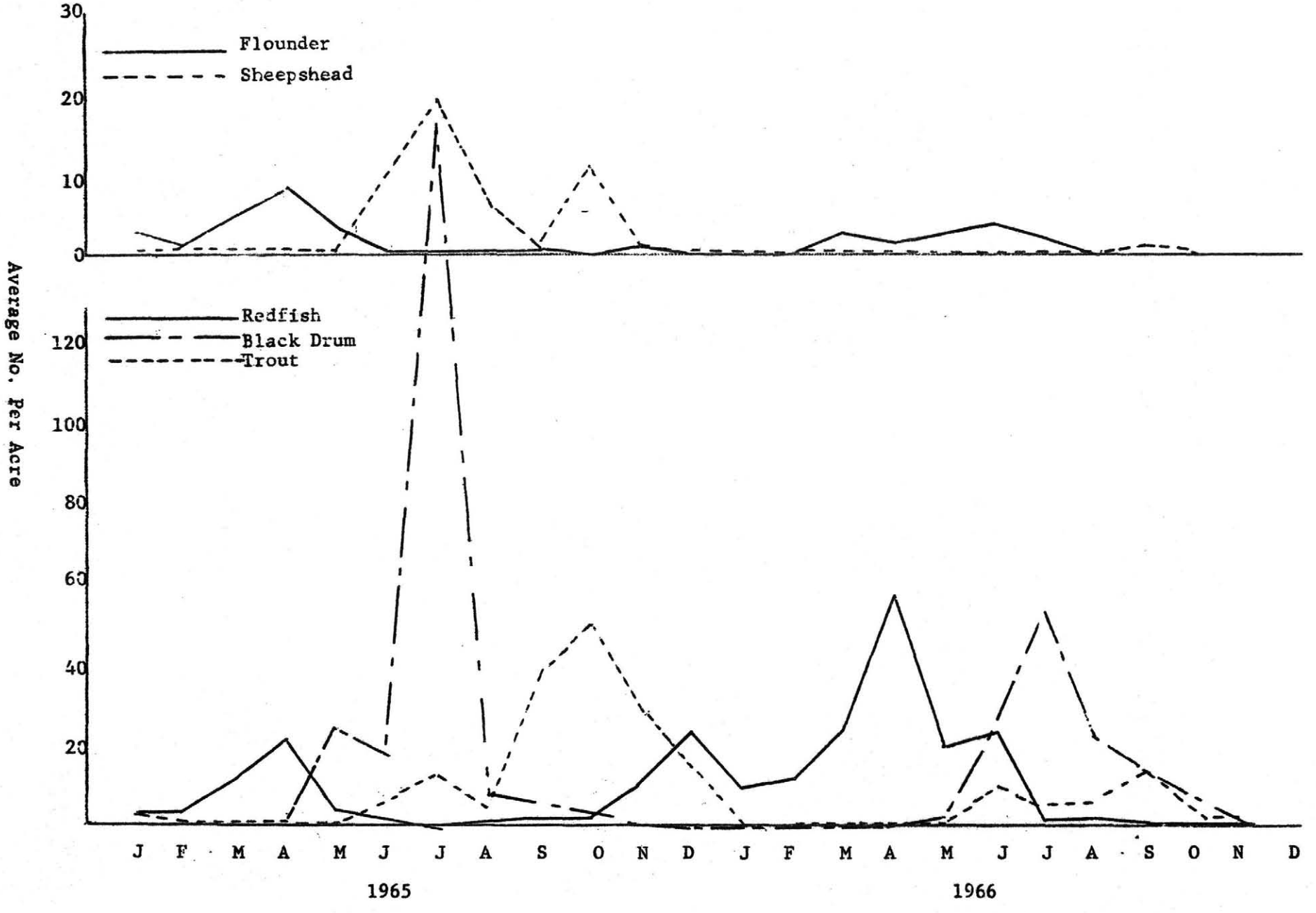
Data received from the adult fish sampling in all seven bay areas indicate that redfish and black drum populations increased in all seven bay areas in 1966. Trout populations were up in San Antonio Bay and the Lower Laguna Madre, down in Galveston, Matagorda and Aransas Bays, with no change noted in Corpus Christi Bay or the Upper Laguna Madre. Sheepshead increased in abundance in the Lower Laguna Madre.

Discussion

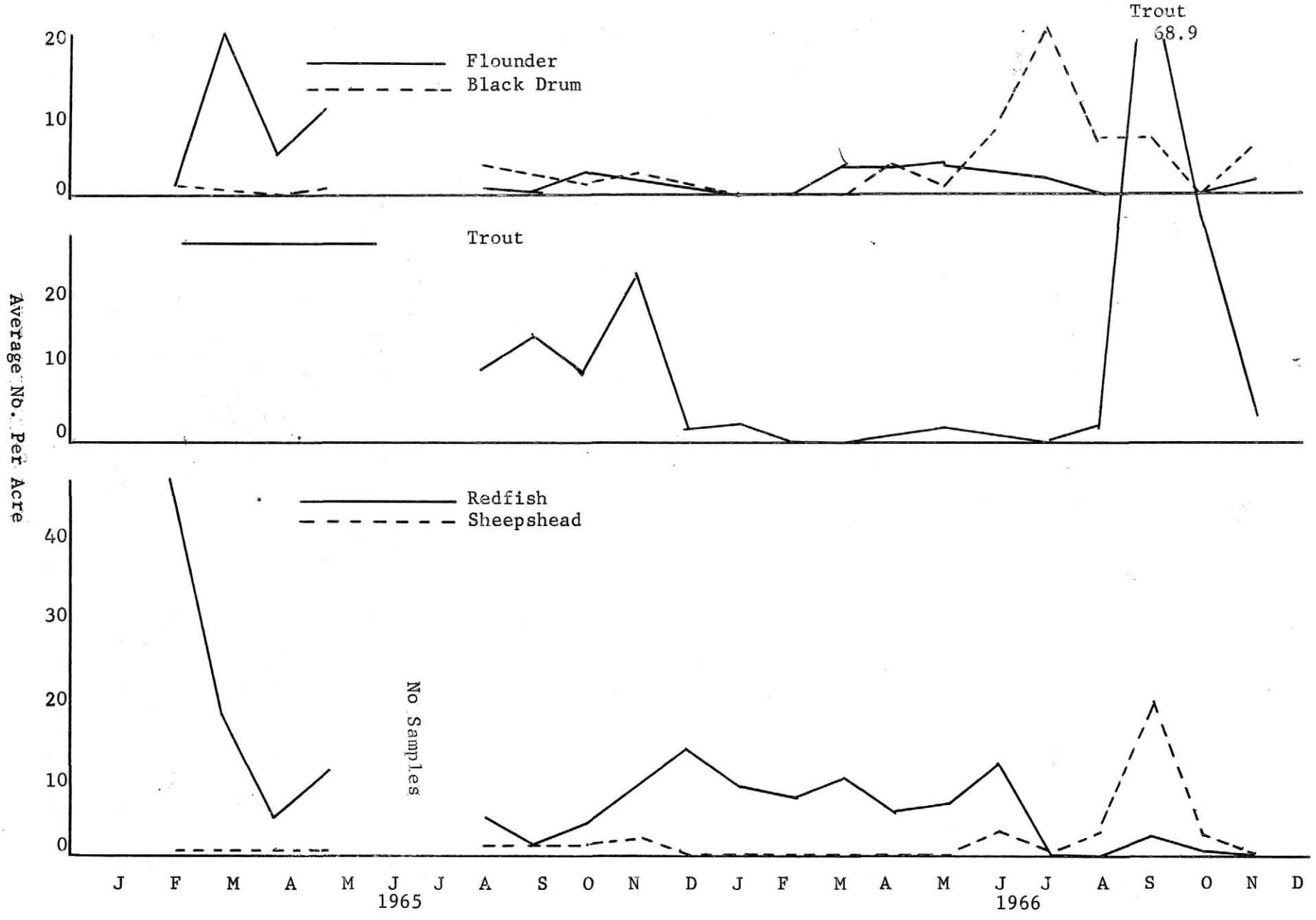
Analysis of data for both juvenile and adult fish sampling indicates that missed samples is the most important single cause of inconclusive data. Greater efforts should be made to assure that all samples are taken as required.

Tests are being made at this time to try to determine the comparative benefits of the two principle methods of adult fish sampling - the drag-seine and the trammel net. Some changes may be made in sampling in some areas if conditions warrant.

No change in sampling periods is recommended.


Flounder
Sheepshead
Redfish
Black Drum
Trout
Average No. Per Acre
30
20
10
0
120
100
80
60
40
20
J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966

Matagorda Bay
1965-1966



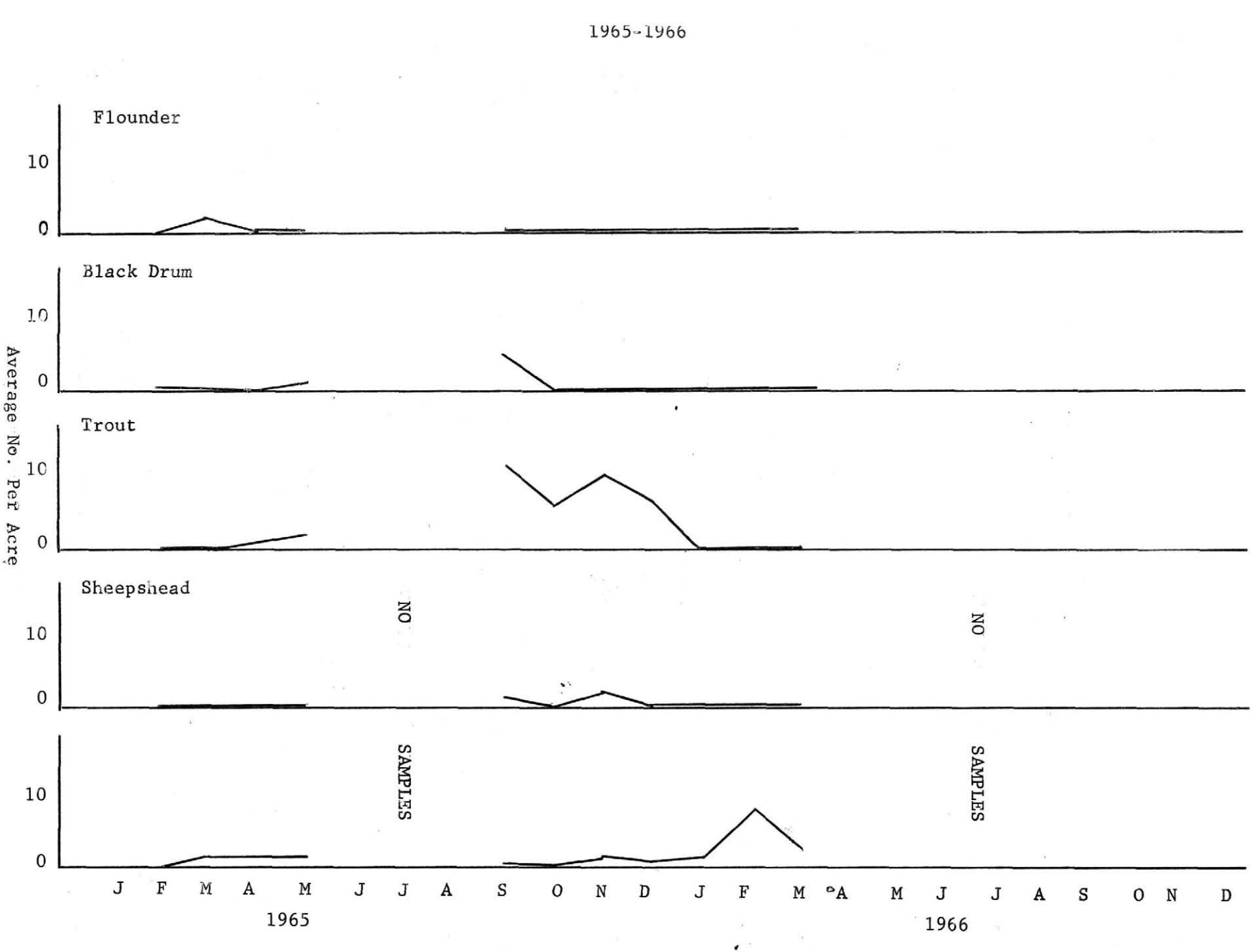
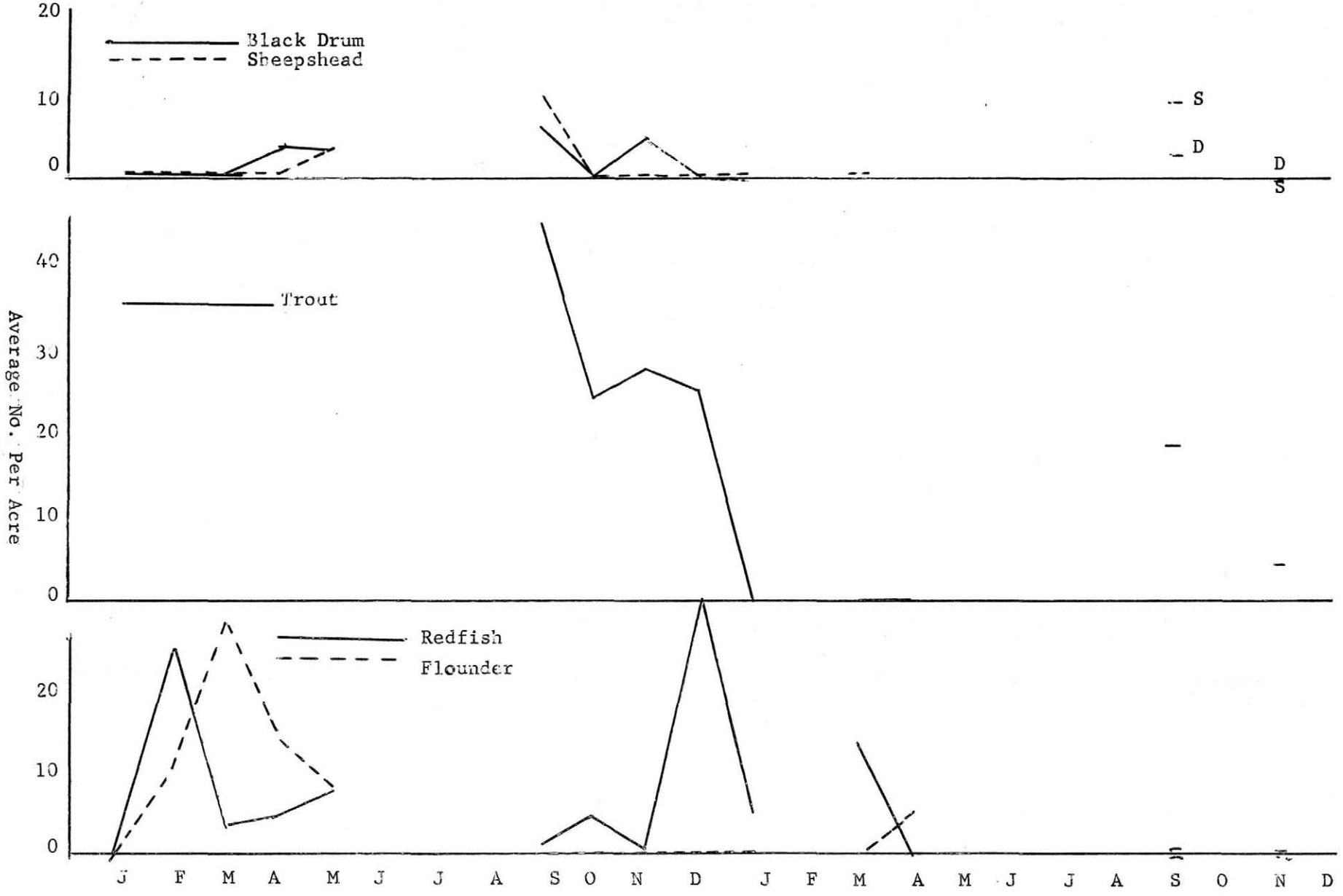

1965-1966
Flounder
Black Drum
Trout
Sheepshead
10
0
Average No. Per Acre
NO SAMPLES
NO SAMPLES
J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966

Figure 4 - Juvenile Game Fish Taken by 60-Foot Seine
Aransas Bay
1965-1966



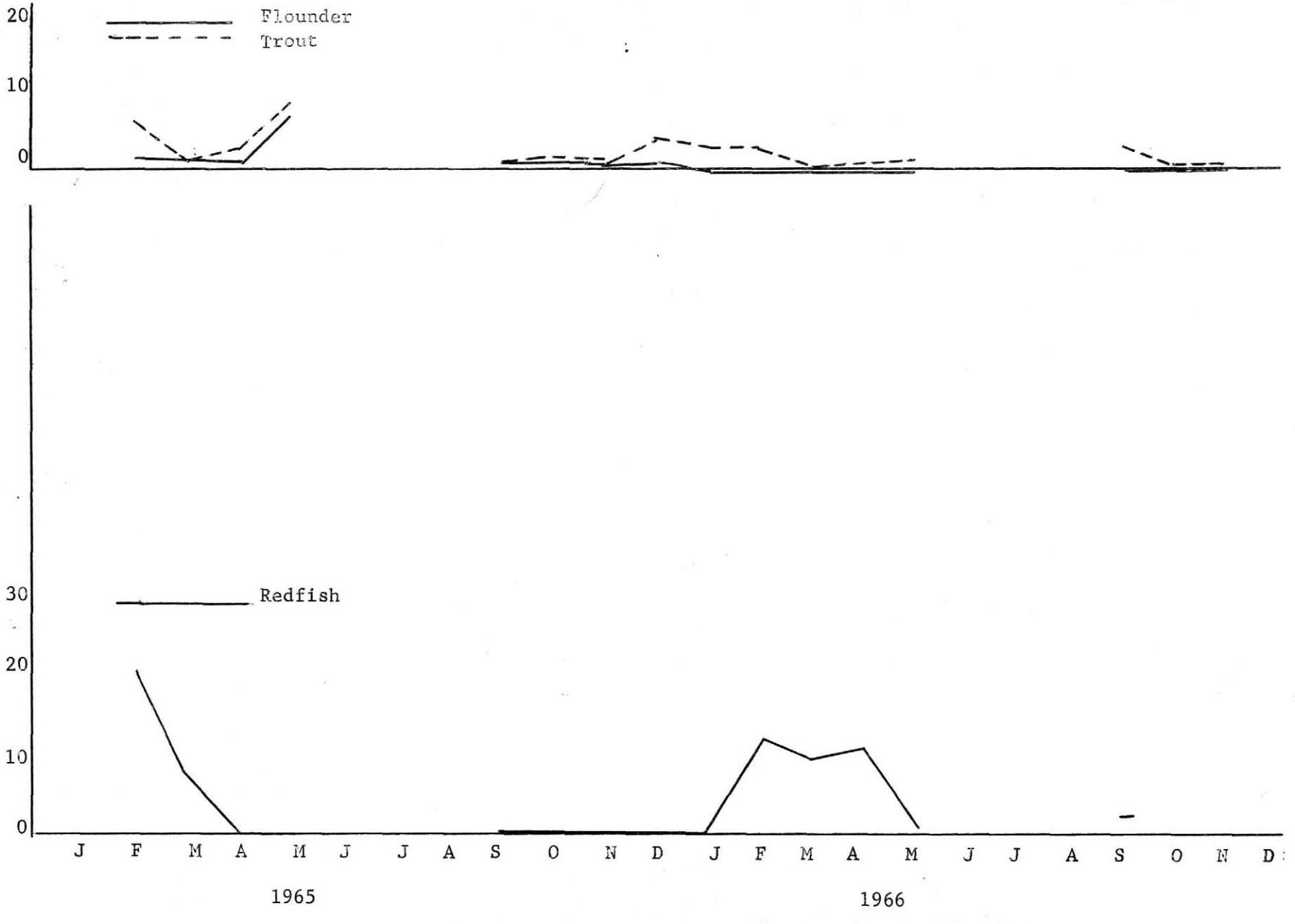
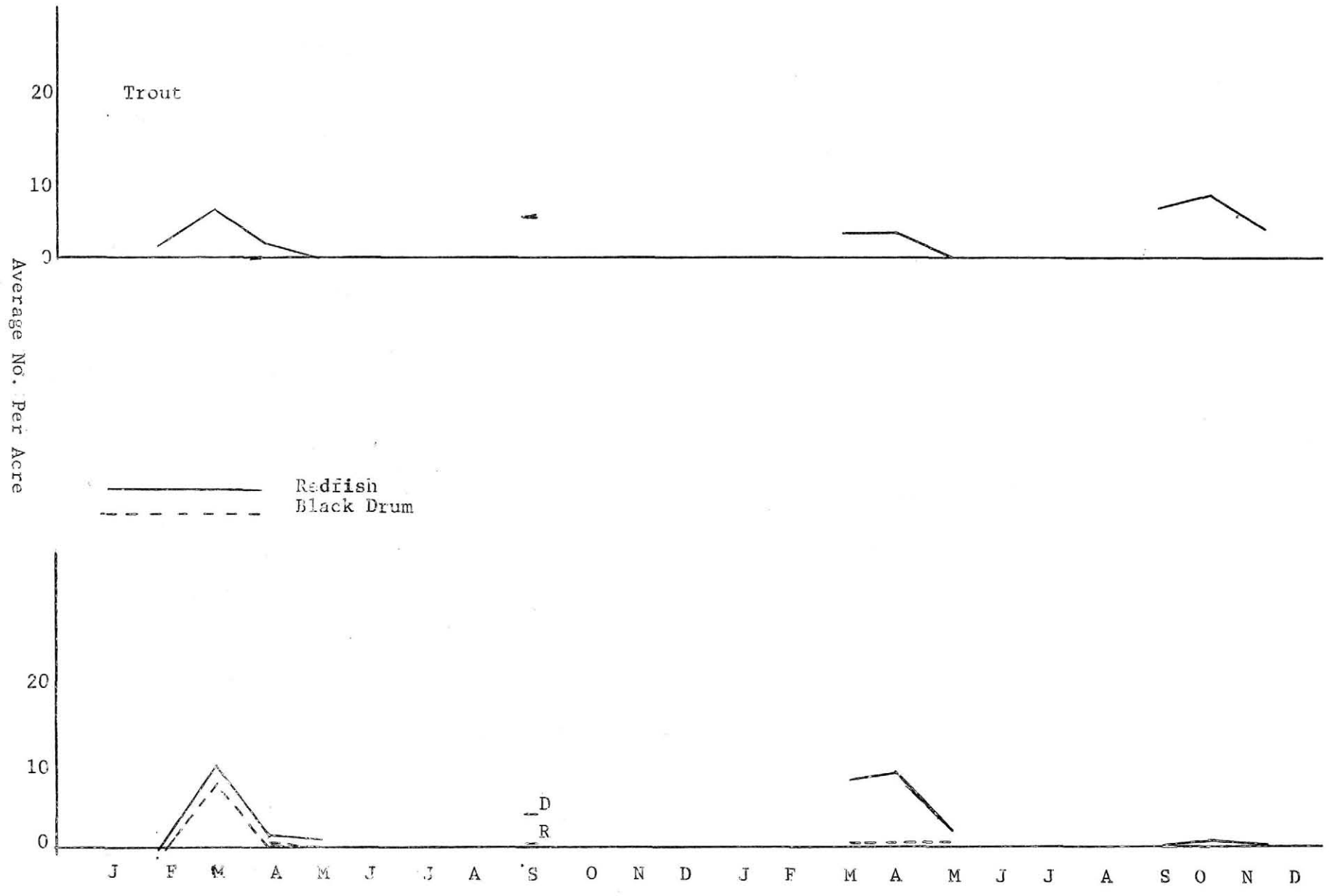

Flounder
Trout
Redfish
20
10
0
30
20
10
0
Average No. Per Acre
J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966

Figure 6 - Juvenile Game Fish Taken by 60-Foot Seine
Upper Laguna Madre
1965 -1966



Lower Laguna Madre
1965 - 1966

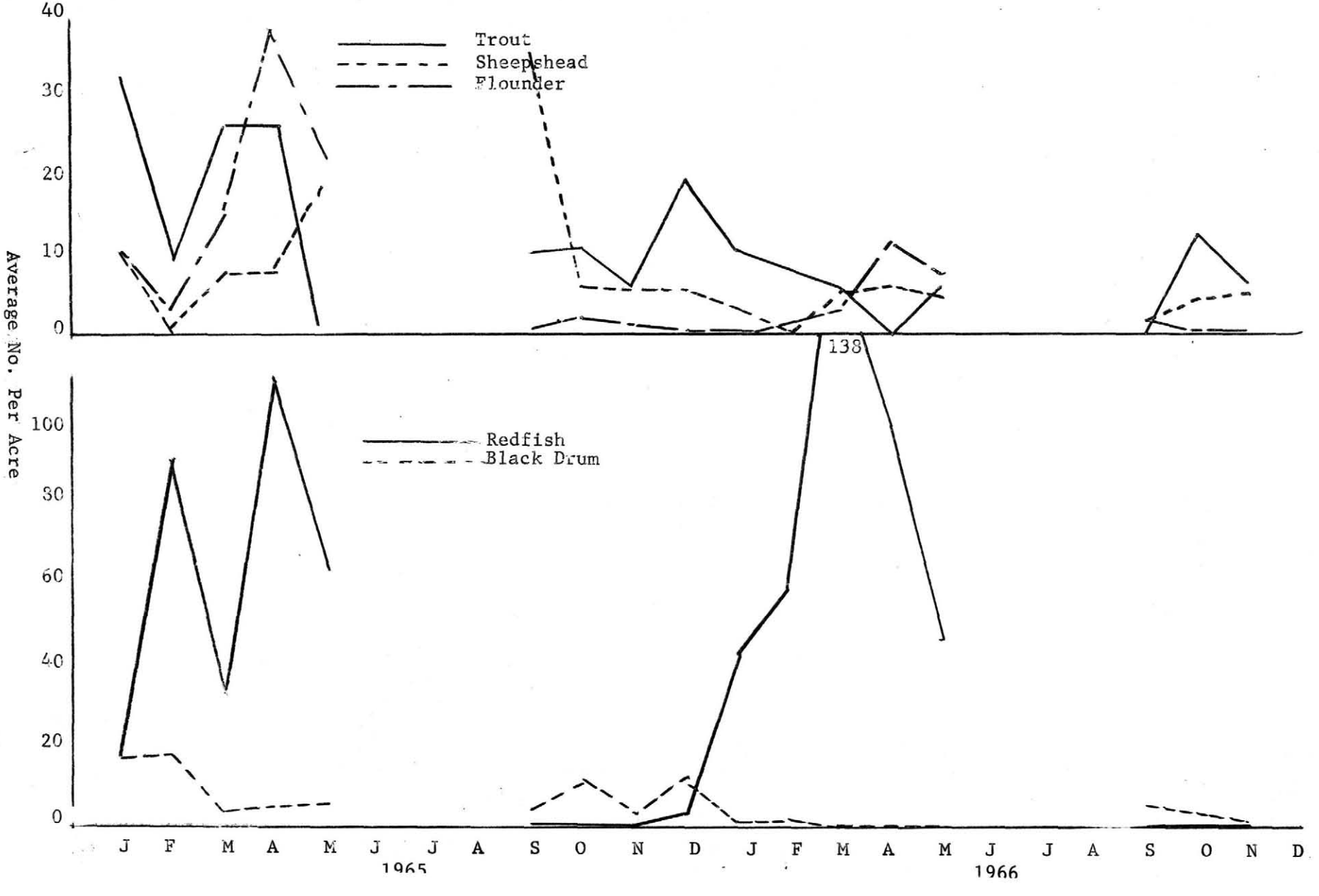
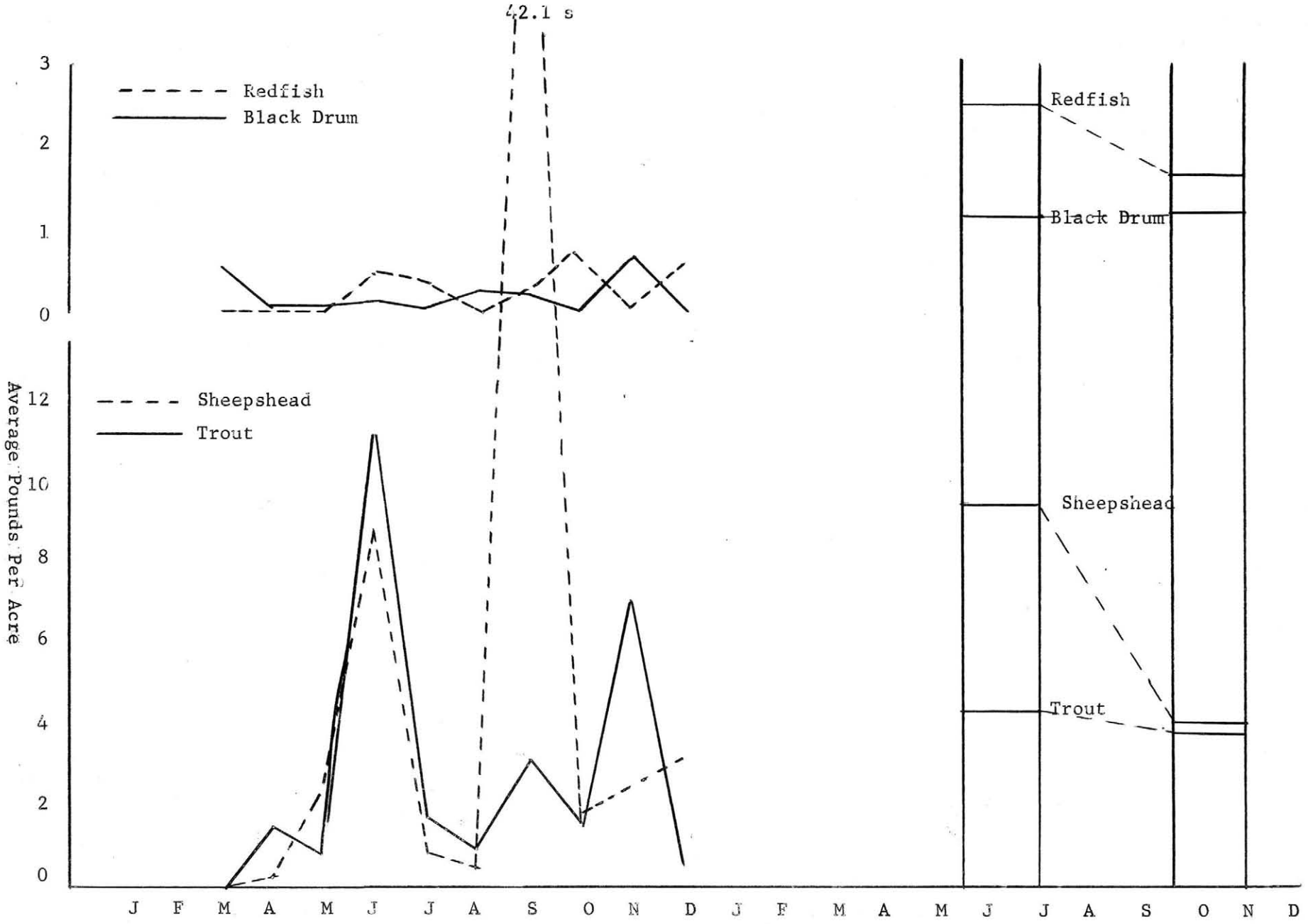


Figure 8 - Adult Game Fish Samples Taken by Drag-Seine and Trammel Net
Galveston Bay - 1965-1966



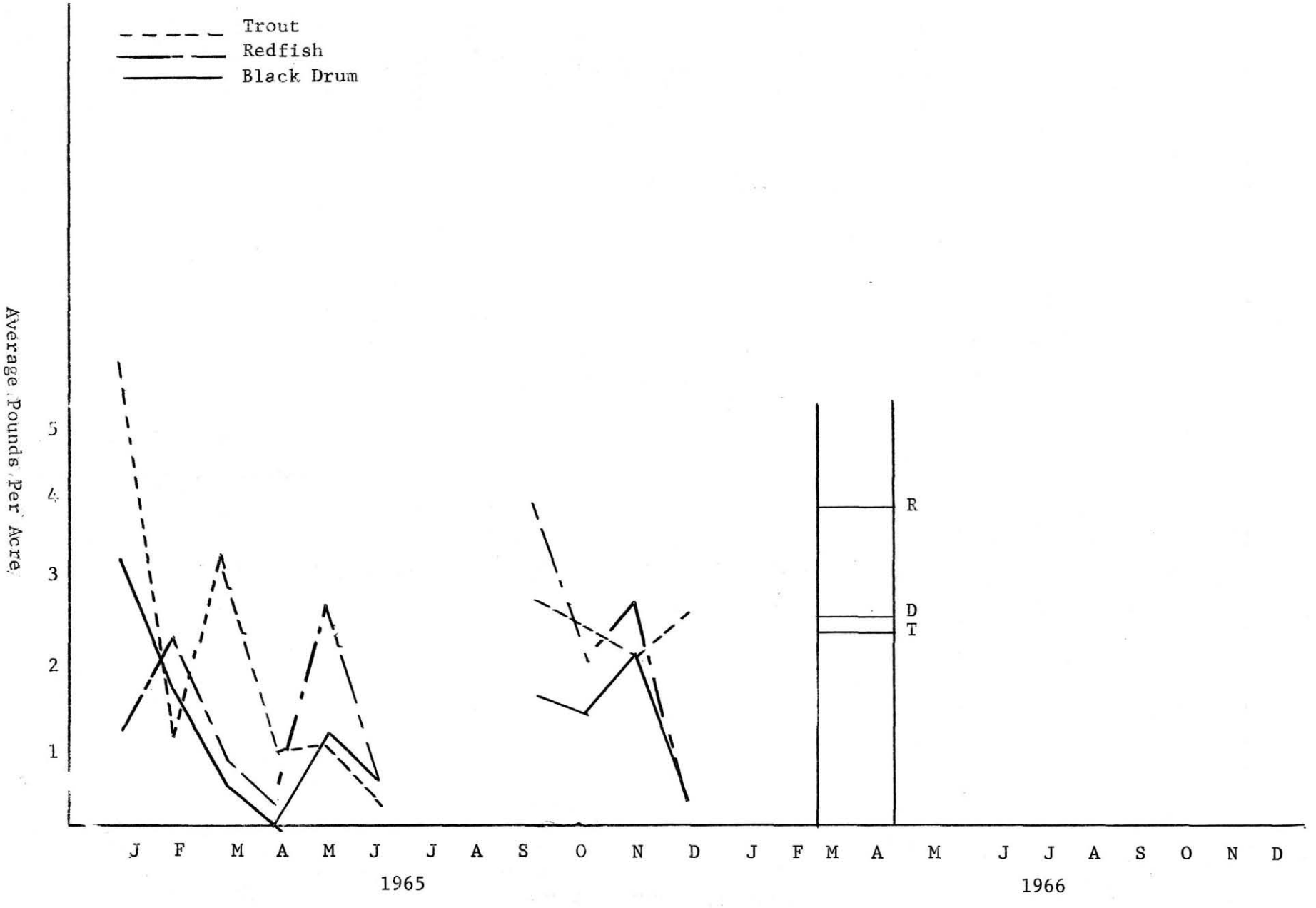
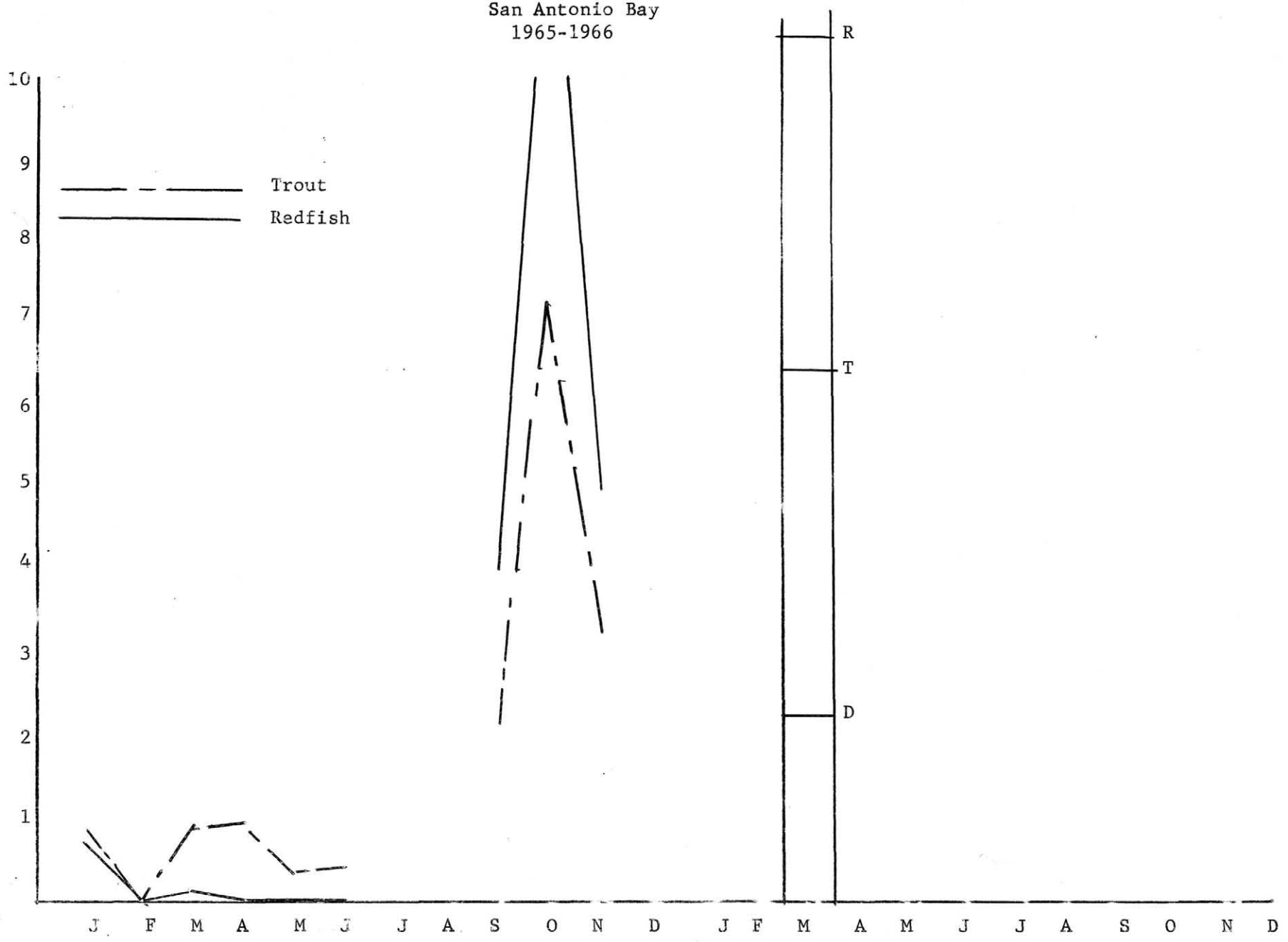

Trout
Redfish
Black Drum
Average Pounds Per Acre
5
4
3
2
1
R
D
T
J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966

Figure 10 - Adult Fish Samples Taken By Trammel Net
San Antonio Bay
1965-1966



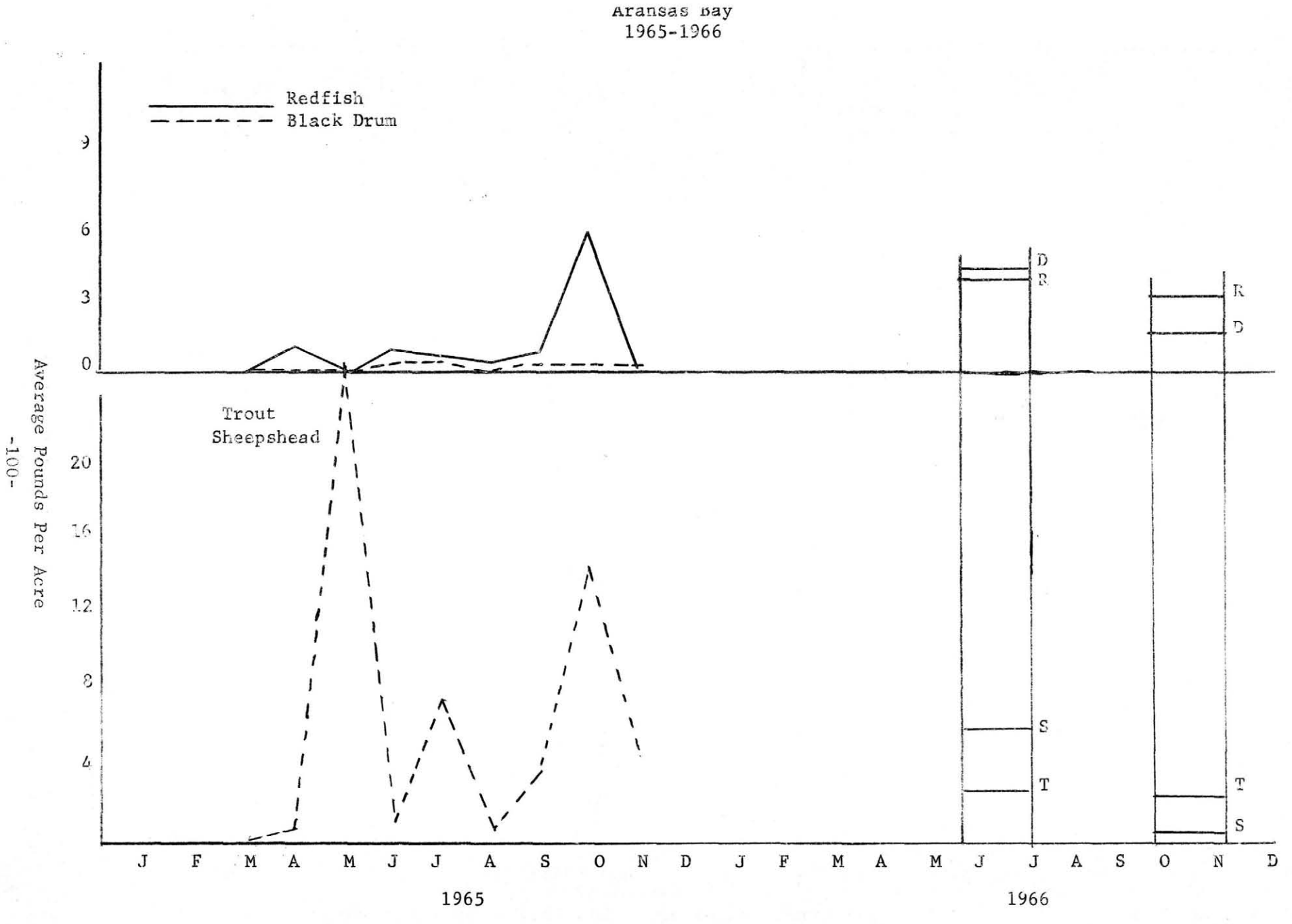
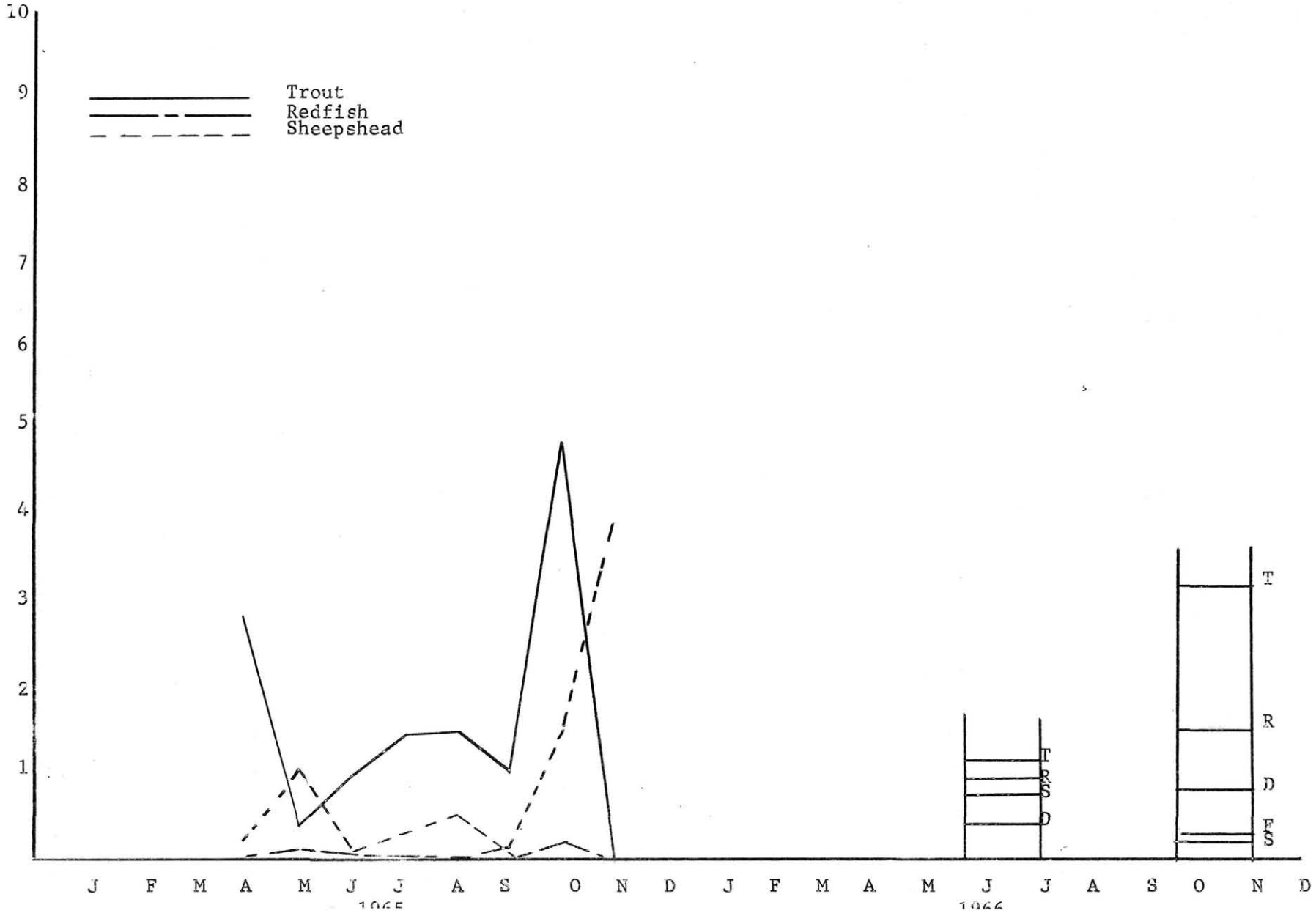

Aransas Bay
1965-1966
Redfish
Black Drum
Trout
Sheepshead
Average Pounds Per Acre
9
6
3
0
20
16
12
8
4
D
R
R
D
S
T
T
S
J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966

Figure 12 - Adult Game Fish Samples Taken by Drag-Seine
Corpus Christi Bay
1965- 1966



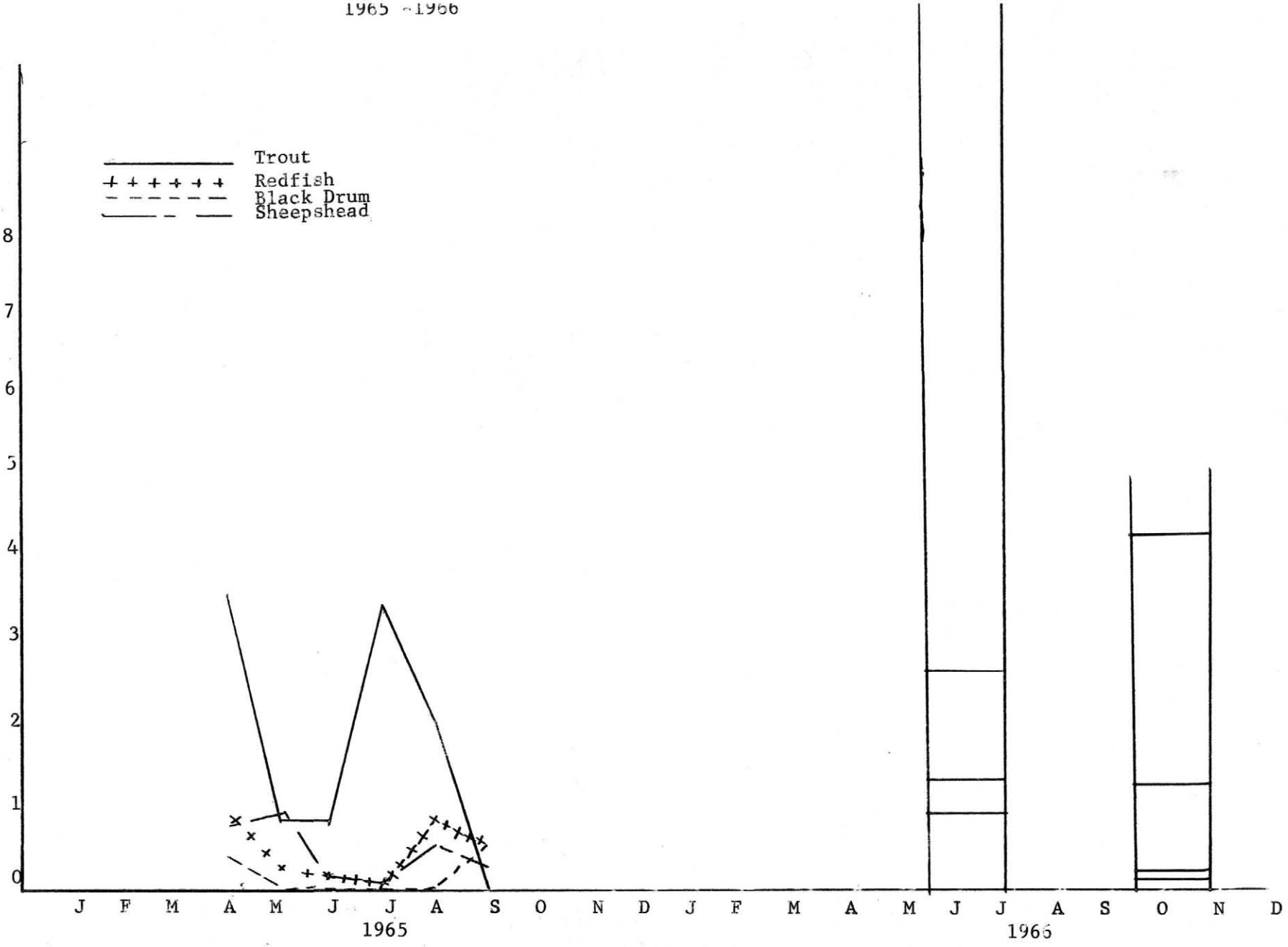

1965 - 1966
Trout
Redfish
Black Drum
Sheepshead
Average Pounds Per Acre
0
1
2
3
4
5
6
7
8
J F M A M J J A S O N D J F M A M J J A S O N D
1965
1966

Figure 14 - Adult Game Fish Samples Taken by Trammel Net
Lower Laguna Madre
1965-1966